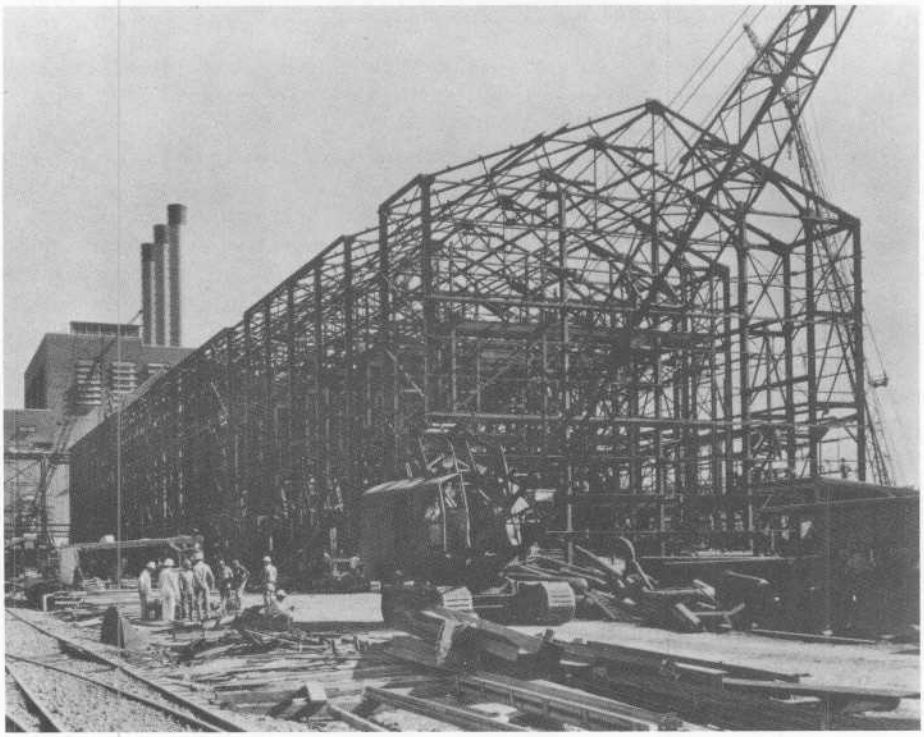
The Manhattan Project

S-50 thermal diffusion plant under construction.



Atomic Energy Commission

The Manhattan Project was the United States' effort to develop an atomic weapon during World War II. In three short years, the project brought atomic weaponry from scientific hypothesis to reality.

Following the discovery of nuclear fission in Germany in 1930, physicists the world over began experimenting to determine if neutrons were released during fission and, if so, how they might be utilized to create a chain reaction. If controlled in a reactor, such a chain reaction would be a great power source. If uncontrolled, it could produce an explosion far greater than any from chemical explosives.

The initial effort to hasten the progress of atomic research in the United States came from the scientific community. A small group of European scientists had settled in the United States after fleeing from Nazism in the late thirties. They were well aware of the atomic research being done in Germany and fearing that Germany would produce an atomic bomb first, they prevailed upon Albert Einstein to persuade President Roosevelt to increase funding for atomic research and development.

After America's entry into the war in December 1941, researchers from the Allied nations joined the effort. The Allies drew up formal agreements on atomic cooperation and a scientific military intelligence unit was established to follow German progress in atomic research.

Public Affairs Office, Corps of Engineers

Hanford plant.

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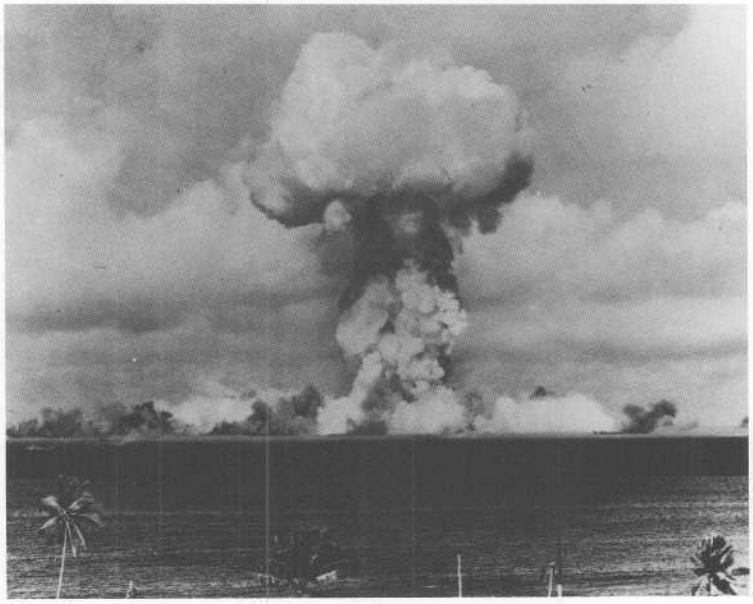
General Groves recognizes Oppenheimer.

By the spring of 1942, research had progressed to the point that an atomic weapon actually seemed possible. The National Defense Research Committee, then coordinating atomic research and headed by Vannevar Bush, began to formulate plans for the construction of production facilities. The U.S. Army Corps of Engineers, designated by the Committee to oversee the program, provided the technical expertise required for this mammoth construction project.

On June 18, 1942, Major General W. D. Styer, Chief of Staff for Army Services of Supply, directed Colonel James C. Marshall of the Corps of Engineers to form a new engineer district. The district was to carry out the Corps' new responsibility for construction for the project.

The new district's offices were initially located in Manhattan at the headquarters of the Corps' New York District. The name "Manhattan" stuck. It seemed to be a name

Mushroom cloud from test detonation on Bikini Atoll, July 1, 1946.



Joint Task Force 1, U.S. Army

Public Affairs Office, Corps of Engineers

First pile area at Hanford Works.

that would arouse the least suspicion, for the district, the project and its super-secret mission.

By September, Major General Leslie R. Groves, formerly Deputy Chief of the Construction Division in the Corps, had been named by Secretary of War Stimson to direct the entire project. Scientific direction remained with the National Defense Research Committee within the Office of Scientific Research and Development that Vannevar Bush headed.

As research continued in the fall of 1942, Groves and Marshall began to select sites for the atomic material production plants. The sites all had to be isolated so they could be sealed off for tight security. They all needed great quantities of both water and electricity. An additional site also had to be found at which scientists could finally assemble the weapons.

At the recommendation of Groves and Marshall, the government purchased 83,000 acres of land near Clinton, Tennessee, for the Clinton Engineer Works (later called Oak Ridge). Here the Corps built uranium separation plants to separate the fissionable isotope Uranium-235 from the isotope more prevalent in uranium ore, Uranium-238. Army engineers also constructed residential communities to house employees.

In December 1942, when Enrico Fermi produced a controlled chain reaction at the University of Chicago, he discovered a new material suitable for fission. He found that during the chain reaction Uranium-238 could capture neutrons and be transformed into plutonium, a new element as unstable as Uranium-235. Twelve days after Fermi's successful experiment, Groves discussed building a plutonium plant site with scientists and industry and Corps representatives. The government soon purchased almost a half million acres around Hanford, Washington, near Bonneville Dam for the construction of five plutonium reactors and employee housing.

Besides building huge industrial plants and providing the most basic community needs of water, roads, sanitation, housing and power, the Corps also managed the construction of scientific equipment, newly designed and as yet untried. At both Hanford and Oak Ridge the project requirements were initially underestimated. At Oak Ridge alone the cost of the land was $4 million. Construction costs at Oak Ridge by December 31, 1946, totalled $304 million. Research at this site eventually totalled $20 million, engineering $6 million, and operation $204 million. Power for operation alone cost $10 million. Instead of requiring a work force of 2,500 people as was originally planned, Oak Ridge eventually had 24,000 employees on the payroll.

As work continued at Oak Ridge and Hanford, General Groves appointed J. Robert Oppenheimer to take charge of the newly created weapons laboratory in an isolated desert area around Los Alamos, New Mexico. Here scientists assembled the weapons. The first explosion of an atomic bomb occurred here.

The engineering problems encountered in the project were numerous. Groves and his staff fought constantly for needed raw materials. The engineers continually had to translate the scientists' theories into precise specifications. New materials had to be formulated for the building of the reactors and the separation equipment. Contractors were held to extremely exacting specifications for everything they supplied.

The Corps' engineering role required the simultaneous coordination of construction with research and new discoveries. It required the building of huge industrial facilities along with community public works needed to provide a livable environment for the employees. It required the transportation of goods to these isolated areas, the management of huge amounts of money and the coordination of input from hundreds of contractors.

The project also required the maintenance of a delicate relationship between the military and the scientific communities. Workers and scientists had relocated to physically isolated areas and because of the secrecy of their work, had to limit their contact with the outside world. Even in wartime, when the work had a special urgency and sacrifices were made for the war effort, morale was a great concern. The scientists especially were uncomfortable under the military supervision and security restrictions. Very few of the thousands of employees on the project knew what they were actually working on because of the strict security. The employees did share, however, in the anxiety over the unknown dangers inherent in the materials they dealt with. No one dreamed at the beginning how massive the project would become and that its cost by war's end would total $2 billion. Very few realized the tremendous impact the project would have on the world.